UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Ground Water Branch

1 Lyons
2 [illegible]

A BRIEF GROUND-WATER RECONNAISSANCE, POINT REYES NATIONAL SEASHORE, MUDDY HOLLOW DRAINAGE

By

E. J. McClelland

Prepared at the request of the
National Park Service, Department of the Interior

ADMINISTRATIVE REPORT
FOR OFFICIAL USE ONLY

Sacramento, California
May 10, 1963
Revised May 29, 1963

A BRIEF GROUND-WATER RECONNAISSANCE,
POINT REYES NATIONAL SEASHORE,
MUDDY HOLLOW DRAINAGE

By E. J. McClelland

INTRODUCTION

In response to an emergency telephoned request on April 26, 1963, by Mr. Cole, National Park Service and a subsequent written request of May 2, 1963, by L. J. Diedrich, National Park Service, the Geological Survey conducted a brief 3-day field reconnaissance of one small valley of the proposed Point Reyes National Seashore to provide information on the ground-water supply in that immediate area. The investigation also included a search of Geological Survey and State of California, Department of Water Resources files in Sacramento for any previously collected data. Of the 3 days in the Point Reyes area, about one half the time was spent in field inspection of the area and the other half was spent in contacting other sources of information. These included a conference with Mr. Alan J. Galloway concerning the geology of the area, examination of California Public Utility Commission records, and Marin County Sanitation Department files concerning Drakes Bay Estates, and discussion with representatives of the Petaluma Pump and Well Drilling Co., who constructed two public-supply wells for Drakes Bay Estates.

The following presents the information obtained from the above and the conclusions of E. J. McClelland, Fred Kunkel, and W. L. Burnham about the ground-water supply in the area. The conclusions are brief and because there has been insufficient time for collection of detailed data they necessarily are preliminary and may be subject to revision when more detailed information is available.

Digitized by the Internet Archive
in 2012 with funding from
LYRASIS Members and Sloan Foundation

http://archive.org/details/briefgroundwater00mccl

DIRECT OBSERVATIONS

The Muddy Hollow drainage (fig. 1) is an alluvial-filled valley about 2.5 miles long and about 200 to 300 feet wide on the valley floor. A stream, shown as perennial on U.S. Geological Survey quadrangle maps, flows down the valley (discharge at downstream end measured on May 2, 1963, was about 2,000 gpm). Water seeping from the surrounding hills provides the base flow for the stream that discharges into a pond behind a low earth-fill dam placed near high tide. The pond in turn discharges into the lagoon. About 0.5 mile upstream from the dam is an unused well (for convenience, called well no. 3), measured depth 99 feet, flowing about 5 gpm on April 30, 1963. A water sample was taken at well no. 3 and analysis indicates 328 parts per million dissolved solids; sodium and bicarbonate are the predominant cations and anions.

About 0.4 mile farther upstream are two public-supply wells belonging to the Inverness Water Co. (These are numbered 1 and 2, corresponding to the company numbers.) No discharge or water-level measurements could be made as the wells were sealed. However, the absence of leaking water around the pump base indicates that the wells probably do not flow. There are many stock wells on the hillsides and hilltops of the peninsula, indicating that small quantities of water probably can be obtained almost anywhere. One of these examined on the ridge to the east of Muddy Hollow at a windmill was 128 feet deep and on April 30, 1963, the water level was 28 feet below land surface, or about 300 feet above mean sea level.

A chalked note on the wall of the garage at the site of well 1 states that well 1 pumped 58 gpm and well 2 pumped 51 gpm. No date or duration of pumping was given.

RELIABLE INFORMATION FROM OTHER SOURCES

The geology of the area is described in the Land Use Survey for the Point Reyes National Seashore. That information, amplified verbally by Mr. Alan J. Galloway of the California Academy of Science, indicates that the entire land area surrounding Muddy Hollow is underlain by fine-grained mudstone, siltstone, and shale. These fine-grained materials are probably extensively fractured and may be adequate sources of water where only small quantities are required, such as in the case of the stock wells previously mentioned. They may also yield a very limited and seasonal supply. Mr. Galloway said the existence of sandstone aquifers in the shale section could not be ruled out, but the sandstones that he had seen were silty and he doubted that they would be good aquifers.

REPORTED INFORMATION OF UNKNOWN RELIABILITY

Log of well 1 (from files of Marin Co. Sanitation Dept.)

Black heavy clay-------------------	from 1 to 40 feet
Clean gravel------------------------	40 to 72
Black clay--------------------------	72 to 75

8-inch casing perforated 55-75 ft. Water level 35 ft below land surface datum after 4 hours pumping at 60 gpm.

Well 2 (from files of Marin Co. Sanitation Dept.)

Drilled to 100 ft and still drilling--final depth unknown, no log available.

The Petaluma Pump and Well Drilling Co. reports that the two wells described above have a combined maximum capacity of 150 gpm and that well 3 flowed but did not "produce." A report of a pumping test of well 3 indicated that the yield of the well was small. The drilling company reported, on May 1, 1963, that the wells do not produce from identical sources and have different drawdowns, and on May 7, 1963, said they are "about the same." The streamflow was measured (or estimated) by the pump company at 500 gpm in the "fall" of the year. The year was not specified.

CONCLUSIONS

The water supply in Muddy Hollow drainage, operated by the Inverness Water Co., is produced from saturated stream gravel buried in the alluvial fill in that drainage. The source of water in the gravel is precipitation on the drainage area. Precipitation recharges the gravel by two routes. The main route probably is from the stream wherever the stream is in direct contact with the gravel or is separated from the gravel by materials that permit movement of water from the stream into the gravel. The other route is by seepage along fractures and bedding planes in the siltstone and mudstone that form the walls of the valley.

The limits of the gravel are not well defined by the information available. However, sufficient information is available to allow a reasonable range of storage capacity to be estimated. The gravel thickness as given by the driller is about 30 feet. If the width of the gravel is assumed to be about 200 feet, its length along the valley upstream from the dam to be about 8,000 feet, and its specific yield to be 25 percent, the storage capacity of the gravel would be about 270 acre-feet of water. This represents the probable maximum storage capacity of the gravel.

The drilling company suggests that any future wells should be drilled upstream from the existing wells. If this is done that part of the storage capacity downstream will not be utilized. With this in mind and assuming that the gravel may average only about 20 feet in thickness and about 100 feet in width, the length of the valley upstream from the existing wells is about 5,000 feet, and the specific yield is 25 percent, then a more conservative estimate of the storage capacity would be about 60 acre-feet of water. This is, as stated, a conservative, but not necessarily a minimum, estimate of storage capacity.

The single example of generalized discharge-drawdown information provided by the drilling company is from a test in well 1, the water level before pumping was "less than" 10 feet below land surface and maximum pumping level was about 35 feet below land surface after 5 hours of pumping at 60 gpm. Well 2 was said to be "about" the same. From these reported data, specific capacity (gpm per ft of drawdown) of the well is calculated at a maximum of about 3. This low value for specific capacity indicates that no substantial increase (ie., doubling or tripling) in discharge from these wells is likely.

Wells 1 and 2 located close together near the center of the valley both produced a supply of water large enough to warrant the installation of pumps. Well 3, about 0.4 mile downstream and also near the center of the valley, did not produce a large enough supply to warrant installation of a pump. These facts suggest that the position of the gravel aquifer is not always predictable. However, it is reasonable to assume that several additional wells of capacity similar to those presently in use probably could be developed in this little valley wherever sufficient gravel is found. It is unlikely that wells having yields of several hundred gallons per minute could be developed.

The discharge-drawdown data can be used to derive an estimate of the quantity of water moving down the valley across an interface normal to the direction of movement. If it is assumed that a well field can be developed upstream from the existing wells that successfully tap the same gravel aquifer, and if it is assumed also that the sole source of recharge to the aquifer is upstream from the well field, then the well field could only sustain a maximum discharge equal to the maximum quantity of water which could move downgradient to the well field, regardless of the number of wells or the size of the pumps. Using the specific capacity (3 gpm/ft of drawdown) previously noted, the estimated width of the gravel

aquifer (100 ft), and assuming a hydraulic gradient equal to the topographic gradient of the valley floor, the quantity of water moving downgradient in the gravel aquifer can be calculated as about 8,000 gallons per day (gpd). This figure, 8,000 gpd, would then represent the maximum sustained yield which could be anticipated if the assumptions made are correct. It must be recognized that this estimate is derived from the extension of several assumptions and some questionable data and could be doubled or halved on the basis of an equally acceptable set of assumptions.

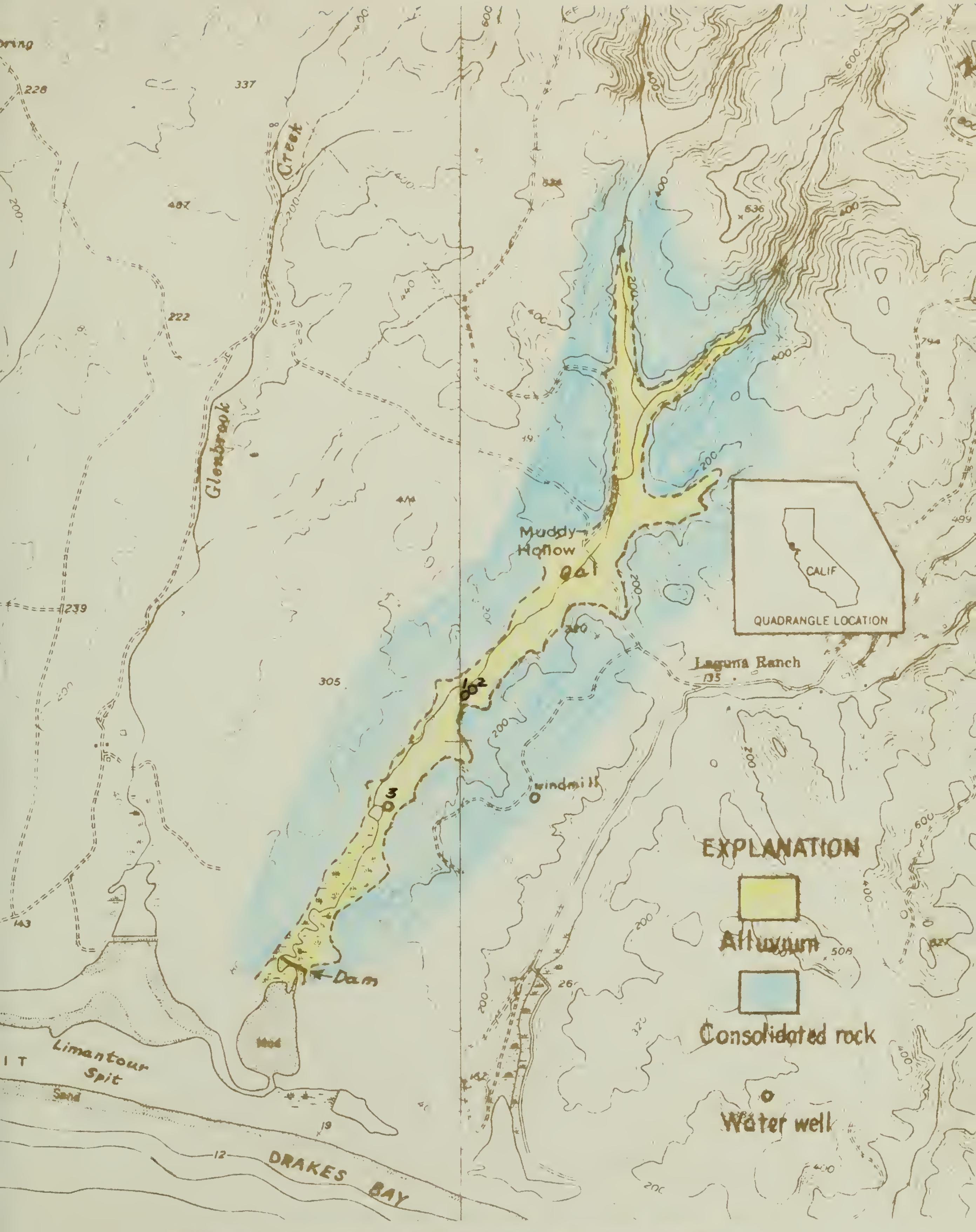

Figure 1. Map of the Muddy Hollow drainage